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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
MOORE, KARLA A

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 09/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/982,954	SANDHU ET AL.	
	Examiner	Art Unit	
	Karla Moore	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17,46 and 47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 46-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6-8 and 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al.

3. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

4. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

5. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

6. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

7. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al. and Fong et al. as applied to claims 1-4, 6-8 and 10-17 above, and further in view of U.S. Patent No. 6,056,849 to Straemke.

9. The prior art discloses the invention substantially as claimed and as described above.

10. However, the prior art fails to teach a physical barrier present between adjacent deposition regions.

11. Straemke teaches the use of a closeable, gas tight door (Figure 1, 12) to isolate the deposition area of a treatment chamber and discloses that multiple processing areas can be separated using the doors (column 3, row 50).

12. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided gas tight doors as means of physically separating deposition regions in the prior art in order to provide more effective isolation of adjacent chambers, which results in decreased contamination between the chambers.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over McInerney et al. and Fong et al. as applied to claims 1-4, 6-8 and 10-17 above, and further in view of U.S. Patent No. 6,207,005 B1 to Henley et al.

14. The prior art discloses the invention substantially as claimed and as described above. Additionally, McInerney et al. teach that there is no limitation as to the specific number of chambers that can be used (column 3, row 26).

15. However, McInerney et al. fail to teach an apparatus comprising a third pair of atomic layer doping regions.

16. Henley et al. disclose a deposition apparatus comprising 3 pairs of deposition regions (Figure 1).

17. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an additional pair of deposition regions in order to increase the throughput of the deposition apparatus as taught by Henley et al.

18. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al. further in view of European Patent Application No. 0 060626 to Gattuso et al.

19. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

20. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

21. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

22. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

23. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer

doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

24. The prior art above fails to teach an inert gas curtain provided at a higher pressure than said first dopant species.

25. Gattuso et al. teach the use of an inert gas curtain provided at a pressure somewhat higher than that of the reaction gases within the chamber to create an effective, non-reactive gas curtain (abstract).

26. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an inert gas curtain at a higher pressure than the reaction gases in the prior art in order to create an effective and non-reactive gas curtain as taught by Gattuso et al.

27. Claim 47 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,319,553 to McInerney et al. in view of U.S. Patent No. 5,935,334 to Fong et al. further in view of U.S. Patent No. 5,382,126 to Hartig et al.

28. McInerney et al. disclose the invention substantially as claimed, including: a multi chamber deposition apparatus (Figure 10) for processes such as atomic layer doping, where simultaneous processing of wafers in separate regions is desired (column 3, row 9). The apparatus comprises a plurality of regions (column 3, row 29; Figure 10, 112, 114, 116, and 118) and a centrally located loading assembly (Figure 3, 104; column 4, row 21) for moving substrates from one region to another. The plurality of regions can be separated into two pairs of regions, so that, in each pair of regions a first region (112 or 116) is capable of applying a first gas species and a second region (114 or 118) is capable of a second processing step (column 5, row 14). All regions are adjacent and chemically isolated form one another by an inert gas curtain of argon (Figure 1, 210; column 8, row 37).

29. Similar to the claimed invention, the loading assembly is capable of moving a plurality of substrates through all four regions sequentially or in a predefined pattern (column 5, row 5). Thus, a plurality of substrates can be treated simultaneously in respective pairs of first and second regions and then transferred to another plurality of regions.

30. However, McInerney et al. fail to teach a first atomic layer region used for deposition and a second atomic layer region used for thermal diffusion of the dopant species.

31. Fong et al. teach deposition of a dopant species in a first processing region and transfer to a second processing region, such as an annealing chamber or a rapid thermal process reactor, for the purpose of driving in the dopant atoms (column 41, row 61 through column 42, 12).

32. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a first atomic layer doping region for deposition and a second atomic layer doping region for thermal treatment in McInerney et al. in order to diffuse the dopant atoms as taught by Fong et al.

33. Additionally, McInerney discloses that each of the gases can be connected to any number of gas supplies so that several different gases can independently controlled to flow through each showerhead (column 5, rows 14-20). This is interpreted as: any of the gas supplying showerheads (specifically those in the second region) are capable of being connected to a non-reactive gas supply source. When combined with Fong et al., as detailed above, one is left with first and second doping regions capable of depositing a doping species in a first region and allowing that species to diffuse with the assistance of a non-reactive gas in a second region.

34. Examiner realizes that the prior art fails to explicitly teach the use of a non-reactive gas in a second region. However, this is seen as an intended use of which the prior art would be capable. The courts have ruled that expressions relating the apparatus to the contents thereof during an intended operation are of no significance in determining the patentability of the apparatus claim. Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969).

35. The prior art discloses the invention substantially as claimed and as described above.

36. However, the prior art fails to teach a separate gas exhaust for each region in a multi-chamber coating apparatus.

37. Hartig et al. teach the use of separate gas exhausts in each chamber for the purpose of aspirating gas from each chamber and further preventing gas transfer between the individual chambers (column 2, rows 17-22).

38. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided separate exhaust mechanisms in each chamber in order to aspirate each chamber and further prevent gas transfer between the individual chambers as taught by Hartig et al.

Response to Arguments

39. Applicant's arguments filed 06/26/03have been fully considered but they are not persuasive.

40. Showerheads 136 and 138, in McInerney, indicate two different processing regions. Applicant argues that there is not motivation to use one of the two showerheads for supplying a non-reactive gas source. While the prior art does not use the exact same language as the present Application, one of ordinary skill in the art would recognize with two separate showerheads, two different types of processing can be formed. Further, in the present application, where the claimed invention is an apparatus, the fact that each showerhead is capable of supplying a gas is sufficient for rejection purposes. Applicant's has included an intended use for a second showerhead. The intended use is for supplying an non-reactive gas. McInerney would be capable of supplying a non-reactive gas. The courts have ruled a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

41. With respect to Applicant's argument that the inert gas curtain in McInerney is not an inert gas curtain as described in Applicant's specification, Examiner points out that by assisting in directing the flow of gases into respective gas wells, McInerney is assisting in constraining two gases to their respective chambers. Also, the inert gas curtain is formed between the two chambers. It separates the two chambers. It is there for the same purpose as Applicant's claimed invention—isolation. While the verbiage used to describe the feature is not the same in the presently claimed invention and the prior art, one of ordinary skill in the art would recognize that the structures are intended for the same purpose.

42. Applicant argues that because using multiple processing chambers increases throughput, one would not be inclined to use the apparatus of McInerney for diffusion, as claimed. As expressed in the advisory action, one of ordinary skill in the art would recognize that throughput is not the only parameter

to be maximized in processing apparatus such as McInerney and the present invention. One of ordinary skill in the art would also consider other parameters such as quality of the substrate produced and would aim for a balance between these two parameters in substrate processing. In some case, multiple processing chambers are necessary, as is well known in the art. Also, as noted above, Applicant is once again relying on an intended use of the apparatus. Regardless of what type of gas Applicant intends to use in the apparatus and the deposition method used in the claimed apparatus, the structures are not different.

43. As noted in the previous office action and advisory action, Fong teaches transferring a substrate to a separate processing region to drive in dopants at column 41, row 61 through column 42, line 12. The specific teaching can be found in column 42, rows 2-7. Examiner admits that Fong teaches that there are alternatives for the processing step of driving in dopants. As pointed out by Applicant, one of them is to let the substrate remain in the same chamber. As noted above, one of them is transferring a substrate to a different region as claimed in the instant application.

44. McInerney is silent on the pressure of the inert gas curtain relative to the adjacent processing regions. Gattuso is relied upon for teaching providing an inert gas curtain at a pressure somewhat higher than that of the adjacent processing regions. This provides for more effective separation of two adjacent environments. Applicants arguments are not related to this reasoning for the combination. Applicant argues that providing an inert gas curtain at a pressure higher than the processing gases in adjacent environments would nullify a pressure gradient taught by McInerney, thus making the references uncombinable. Examiner disagrees. Supplying an inert gas curtain at a higher pressure at a location adjacent to a processing location would not interfere with the vertical pressure gradient formed at the processing locations of McInerney. In McInerney the gas pressure gradient is used to assist in evacuation and separation. Providing the higher pressure inert gas curtain would provide further assistance for accomplishing these means.

45. With respect to Applicant's argument that Hartig is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).

As pointed out in the previous advisory action, in this case, similar to McInerney and Gattuso, Hartig is a multiple station processing apparatus, concerned with separation of adjacent stations and the processing gases contained therein. With respect to Applicant's argument that McInerney teaches away from separate exhaust ports, Examiner disagrees. Admittedly, McInerney does not teach separate exhaust ports. However, "not teaching" a feature is not the same as "teaching away" from a feature. McInerney provides no reason why providing separate exhaust ports would ruin the invention, nor does Applicant. McInerney teaches a combined exhaust port, but nowhere in the disclosure does McInerney teach that this is the only way that exhaust operations may be conducted or that their invention is not combinable with inventions that teach separate exhaust ports. Further, Examiner disagrees that there must be some teaching or suggestion in McInerney to use separate exhaust ports. Sufficient motivation is found in Hartig.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km

Primary Examiner
AU 1763

P. Hassanzadeh